UTILITY
OF
AIRPLANE INSTRUMENTS

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The following publication, entitled "Utility of Airplane Instruments," is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

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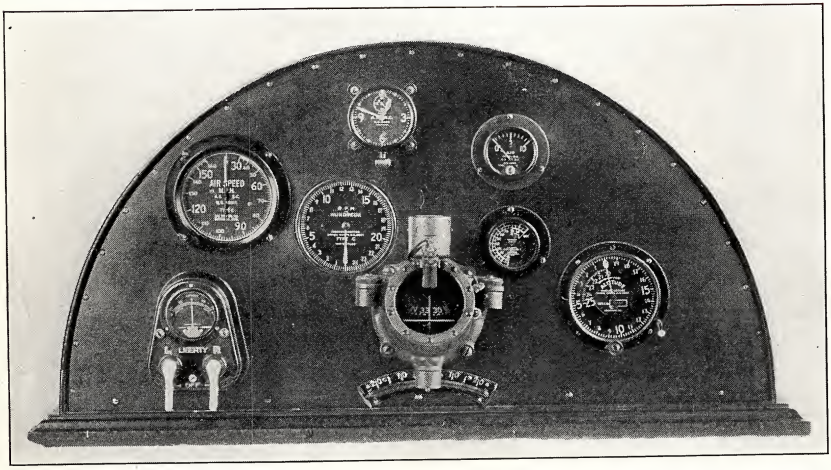

INSTRUMENT BOARD OF DE HAVILAND-4.

UTILITY OF AIRPLANE INSTRUMENTS.

The instruments installed on the pilot's instrument board of a fully equipped airplane are:

I. Engine instruments:
   1. Air-pressure or gasoline-pressure gage.
   2. Oil-pressure gage.
   3. Gasoline level gage.
   4. Radiator thermometer.
   5. Tachometer.

II. Navigation instruments:
   1. Altimeter.
   2. Airspeed indicator.
   3. Clock.
   4. Compass.
   5. Inclinometer.

In addition, there are other instruments, not of general use, but installed on certain airplanes for special tests or uses. The air-pressure or gasoline-pressure gage will not be found on airplanes equipped exclusively with gravity feed for gasoline; nor will the water thermometer be used on air-cooled motors.

These 10 instruments may be divided into two classes—the first 5 being *engine instruments*, which give information regarding the performance of the motor; the second 5 being *navigation instruments*, which give the pilot information regarding the course and position of the airplane.

It is possible for the pilot to fly a ship without a single one of these instruments, and fly well. But in regard to the performance of the motor, the pilot will have greater confidence if he has a set of reliable engine instruments to give him *quantitative information* and warning of trouble, rather than trusting to his judgment. Furthermore, these instruments are of great aid to the motor mechanic in "warming up" and testing a motor preparatory to a flight. For short flights over familiar territory, they are of little use, but for exact navigation over and through clouds or strange country they are indispensable.

None of these instruments is intended to inform the pilot whether or not he is flying the ship correctly. They can never replace the sense of equilibrium and control—the "feel" of the ship—which

every pilot must have. For this reason, the navigation instruments should not be used by one *learning* to fly. But the trained pilot may be able to do more intelligent flying by the aid of these instruments.

As a general thing the navigation instruments should be installed on the instrument board in the observer's cockpit of a two seater, but this depends upon the purpose of the airplane. For reconnaissance and bombing airplanes they are useful.

Airplane instruments have been the subject of considerable adverse criticism. This is generally due to one of three things: (*a*) Some of the early instruments installed were of poor design and cheap construction, and for this reason worse than useless. Because of these poor instruments, pilots became prejudiced against all instruments. (*b*) Because of poor or incorrect installation and lack of care, an instrument may not function properly. (*c*) Through a misunderstanding of the uses and limits of an instrument, a pilot may conclude an instrument is valueless, while if correctly understood it will be of great service. It is the purpose of pamphlets on airplane instruments to give information regarding the use, construction, installation, and calibration of these instruments. The first three of these topics are discussed for each instrument under the appropriate heading. A separate pamphlet is devoted to calibration of all instruments.

REFERENCE.

Pilot's Notes on Principles and Use of Aeroplane Instruments.—Capt. D. L. Webester, Science and Research Dept., B. A. P.

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